DOCUMENT RESUME

ED 096 282 SP 008 411

AUTHOR Prager, Iris J.
TITLE The Reinforcement of First Grade Science Concepts with the Use of Motor Learning Activities.
PUB DATE [72]
NOTE 6p.

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS *Grade 1; *Motor Development; *Physical Activities; *Science Instruction

ABSTRACT

In order to test the theory that selected first-grade science concepts could be successfully reinforced with the use of motor activities, 52 first-graders were exposed to certain experimental procedures. Two separate classes of 25 students (group A) and 27 students (group B) underwent a pretest. Both classes were then taught through traditional teaching methods. After each lesson, group A was taken outside where the science concept was reinforced through a motor activity, while group B participated in pleasurable activities not related to science. The experiment consisted of eight lessons from the Simple Machines unit conducted over a two-week period. After this period, a posttest was administered, and 6 weeks later an extended interval test was given to test the degree of retention. The pretest scores were found to show no significant differences between groups A and B. The results of posttest show that group A scored significantly higher than group B at the .05 level of confidence. There existed no statistically significant difference between the scores of the extended interval test and the posttest, although raw score data indicated that group A scored higher than group B where p. was less than .056. The posttest scores indicate that the use of motor learning activities should be considered an enrichment or reinforcement aid in teaching first-grade science concepts. (Author)

THE PENNSYLVANIA STATE UNIVERSITY
THE CAPITOL CAMPUS
MIDDLETOWN, PENNSYLVANIA 17057

THE REINFORCEMENT OF FIRST GRADE SCIENCE CONCEPTS WITH THE USE OF MOTOR LEARNING ACTIVITIES.

Iris J. Prager, Pennsylvania State University.

Research has shown that the capacity to move one's body effectively and efficiently through space is related to finely developed neurological phenomenon associated with memory, perception and problem solving. This "kinesthetic feedback" produced by the body movement plays a pronounced emphasis in the learning process. (1)

Bruner and Piaget (2) agree that motor intelligence combines and predicts events in relation to muscular experience or condensed mental experience. They further state that motor intelligence proceeds logical intelligence and makes discoveries independently of it. In connection with this Claparede tested the hypothesis that children (by virtue of their more or less conscious bodily experiences), are able to foresee events in the domain of elementary physical laws. In addition, Liprann and Borgen (3) describe devices for inducing children to perform certain movements which presuppose the practical knowledge of mechanical relations.

The use of play or motor activity learning method is not a new concept. Stone (4), McLuhan (5), and Stein (6), each concur with this concept. The present theory of motor activity learning as defined by Humphrey (7) refers to things that children participate in that are an active and pleasurable situation where learning takes place. Motor learning activities can be derived from basic physical education curriculum and might also be referred to as the physical education medium.

In order to test this theory, Humphrey has completed several studies in the areas of reading, mathematics and science. (8) The most recent study of

slow learning fifth grade children compared the motor activity technique with traditional ways of developing science concepts. Two groups of ten children were equated on the basis of a pre-test score. Each group was taught by the same classroom teacher; one group was taught through motor activity learning, the other by traditional procedures. The difference in post-test scores favored the motor activity learning group, p. $<$ .001. The difference is the extended interval test also favored the same group, p $<$ .001.

In a study by Prager, (9) selected first grade science concepts were reinforced through physical education activities. A class of twenty-three students was divided into two smaller but equal groups. The teacher taught a science unit to the entire class using traditional teaching procedures such as lecture, experiments and visual aids. After each lesson the physical education teacher took the experimental group from the room and attempted to reinforce the lesson using physical education activities. At this time the remaining group took part in pleasurable activities that did not relate to the science lesson. At the end of the treatment period the class was given a post-test. According to this test learning took place only in the experimental groups, p .001; no significant difference was found between the pre-test and post-test of the traditional group. The post-test scores showed the physical education group scored significantly higher than the group not reinforced by the physical education activities, p $<$ .05.

Methods: The subjects for this study consisted of 52 first graders in a public elementary school in Prince Georges' County, Maryland. The subjects were enrolled in two separate classrooms consisting of 25 students and 27 students respectively. The purpose of this study was to experiment with motor activity learning to see if it could be integrated as a reinforcement aid in a first grade science unit.

Eight concepts were selected by a first grade teacher. These concepts

were selected from the Simple Machines unit found in the Prince Georges' County Primary School Social Studies Guide. Physical education activities were selected to be used as the instruments of reinforcement. An objective test was developed by the classroom teacher using visual items rather than oral or written choices. Six questions per concept were included. The instrument was found to be reliable with r=.71. The validity of the instrument was approved by a jury of first grade teachers and school administrators. The internal properties of the test were examined and questions that were too difficult, too easy, or non-comprehensible were rewritten.

One classroom teacher elected to instruct both groups during the treatment period. A pre-test was administered to both groups as an instrument with which to test the knowledge of the subjects before any information was imparted. The classroom teacher then proceeded to teach each group independently through traditional teaching methodology. The group designated experimental (group "A") was taken outside after each lesson and the science concept was reinforced through a motor activity. After each lesson with group "B", the class participated in pleasurable activities such as art activities, passive games, etc.

An example of the concept and activity follows: "Magnets pick up iron." The activity used was Chain Tag. The players are scattered around the playing area. Each has chosen an object made of iron to represent. Two couples are chosen to be "It". The couples compose a north and a south magnetic pole. They join inside hands and run after another player, trying to tag him. If they succeed, that player must join hands with the end player who tagged him and try to catch the other players. The game ends when all have been "picked up", with the winners being the team with the most players.

After a two-week teaching unit, the two groups were retested to check the level of learning which took place. All subjects were then retested for

retention at an extended interval of six weeks after the post-test.

Results: By use of the t-test, the pre-test scores were found to have no significant difference. The mean score of the traditional group was 31.1 (SD=4.71) and the mean score for the experimental group was 30.0 (SD=4.51). Analysis of co-variance was used to find a significant difference at the p. $<$ .05 level between the post-test scores of group "A" and group "B". The scores of group "A" (M=38.0; SD=4.19) were significantly higher than group "B" (M=36.0; SD=4.58). Both groups showed a significant rise in scores between the pre-test and the post-test at the p. $<$ .01 level (t-test). Analysis of co-variance of the extended interval test found that there was significant learning in both groups, but there was no significant difference in the scores between group "A" and group "B". Raw score data indicated that group "A" (M=39.7; SD=3.87) scored higher than group "B" (M=37.8; SD=4.46) where the p. $<$ .056.

Discussion: The scores of the post-test indicate that selected first grade science concepts can be significantly reinforced through motor learning activities. If statistical significance is accepted as a criteria for learning, group "A" learned significantly more than group "B" and appears to have retained the knowledge longer.

A basis for this increased learning through motor activity is reported by Piaget (10) when he states that sensory motor experiences (in this case physical education activities) help the child construct concepts and other processes of thinking. Each active experience influences the other and reinforces it. Therefore, each time the child participated in an activity used to reinforce the science concepts, he refreshed the learning experience.

We cannot overlook the motivational aspect of physical education activities. Motivation emanates from accomplishment and enjoyment, no one need be

forced to "play". Motivation is intrinsic. According to Humphrey (11) the motor learning activity approach may be called "motovation", a combination of motivation and proprioception.

Proprioception deals with muscle sense. The proprioceptors are sensory nerve terminals that give information concerning movement and position of the body. The term "motovation" then combines the psychological factor with the physiological factor.

On the strength of these findings and the classroom teacher's recommendation the following conclusions appear to be warranted:

1. The use of motor learning activities should be considered as an enrichment or reinforcement aid in teaching first grade science concepts.
2. The Physical Education teacher might well be considered as an important consultant in the planning of certain types of learning experiences in the science curriculum.

FOOTNOTES

1. James H. Humphrey, Child Learning Through Elementary School Physical Education, (Dubuque, Iowa: William C. Brown Co., 1965), p. 135.

2. Jean Piaget, Child's Concept of Physical Causality, (Littlefield, Adam and Co., 1960), p. 174.

3. Ibid.; p. 138.

4. J. C. Stone, How to Teach Primary Numbers, New York: Benjamin H. Sanborn and Co., 1927), pp. 3-4.

5. Marshall McLuhan, and George B. Leonard, "The Future of Education: Class of 1989," Look Magazine, February 21, 1967, pp. 23-25.

6. Julian Stein, Head of Project on Recreation and Fitness for the Mentally Retarded, Lecture reported in the Washington Star, 1967.

7. James H. Humphrey, "The Use of Motor Activity Learning in the Development of Science Concepts with Slow Learning Fifth Grade Children," Journal of Research in Science Teaching, Vol. 9, No. 3, 1972, p. 261.

8. Ibid., p. 266.

9. Iris J. Prager, "The Use of Physical Education Activities in the Reinforcement of Selected First Grade Science Concepts," Master's Thesis, University of Maryland, College Park, Maryland, 1968.

10. Piaget, op. cit., p. 175.

11. Humphrey, op. cit., (Journal of Research in Science Teaching), p. 265.

12. N. L. Gage, Handbook of Research on Teaching, (Chicago: Rand McNally and Co., 1963).